

BULLARD (W. N.) & BRADFORD (E. H.)

CEREBELLAR TUMOR.

*Operation; Hæmorrhage from Defect
of Occipital Bone; Death;
General Remarks.*

BY

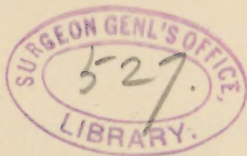
W. N. BULLARD, M.D., and E. H. BRADFORD, M.D.

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CEREBELLAR TUMOR; OPERATION; HÆM-
ORRHAGE FROM DEFECT OF OCCIPITAL
BONE; DEATH; GENERAL REMARKS.¹

BY W. N. BULLARD, M.D. AND E. H. BRADFORD, M.D.

THE patient, a girl, six and one-half years old, was first seen at the Out-patient Department of the Children's Hospital in April, 1890. At this time the mother gave the following history. The family history was entirely negative, except that an uncle on the mother's side had died when ten years old of brain fever.

For a year the patient has been subject to attacks of vomiting preceded by dizziness, when she runs to some piece of furniture or something which she can hold to for support. These attacks occur on an average, three times a week, but sometimes come as often as twice a day. Last Christmas (1889), she had the grippe and since then she has never seemed as well as previously. For six weeks, has been gradually losing power in the right lower extremity. No pain. No incontinence. No other symptoms.

The condition found at that time was as follows: Muscular development, fair, head appears rather large. The measurements were: circumference 50.25 cm.; glabella to inion 36 cm.; antero-posterior diameter, taken by pelvimeter, 18.50 cm.; biparietal diameter, taken by pelvimeter, 15.75. The chest circumference was 56 to 57.50 cm. Pupils dilated somewhat; react to light. Heart negative. Spine normal. Lower

¹ Read before the Boston Society for Medical Improvement, February 9, 1891.

extremities seem alike. No atrophy. No vaso-motor disturbance. Sensation normal. Knee-jerks good. Gait unsteady, staggering.

Was recommended for admission to the hospital.

April 28th. Mother now states that three weeks ago patient began to lose use of the right upper extremity, but that this varied somewhat from day to day. Yesterday, began to lose use of the left upper extremity, and for the first time could not feed herself. Two weeks ago began to have pain in the back, and at times could not bear to have her back touched. Passes very little urine, and that with great difficulty. To-day passed only about a wineglassful, and that took ten minutes.

Present condition. Can move both upper extremities; grasp fair; nothing abnormal in their appearance. Admitted to hospital, service of Dr. Bradford.

May 1st. Has shown no decided evidence of affection of the upper extremities. Urine scanty; 1,015; acid; very slight trace of albumen; abundance of cells, some with one nucleus, some with two or three, single or in clumps.

May 3d. Had an attack of vertigo this morning, and fell. Inco-ordination of lower extremities; cannot move foot in a circle.

May 9th. Examination of the eyes by Dr. Wadsworth. Hypermetropia; papillitis o. u., worse right. Another attack of vertigo this morning.

No arsenic or lead in the urine.

May 17th. Nausea; staggering; almost totally blind. Transferred to medical department for treatment with mercury.

June 10th. Returned to surgical department. Iodide of potassium, gr. i, t. i. d.

June 13th. Iodide of potassium, gr. x, t. i. d. Had slight trouble in ear while on medical side. Complains

much of pain, which is sometimes seated in the back of the head, sometimes in the ears, sometimes in the throat; worse at night and wakes her. Cheeks to-day are swollen, but not œdematous. Pupils widely dilated, equal. Can stand if supported, but sways; cannot walk. (Is now almost totally blind.) Knee-jerks increased and ankle-clonus on both sides.

June 20th. Memory good. Sings songs when asked. Tongue protruded straight. Great variability of pulse. Ataxia not well marked in upper extremities. Right lower extremity weaker than left. Cannot sit up in bed or stand without much support.

June 21st. For past week has wet bed occasionally; now complete incontinence for a day or two. Cannot perceive light.

June 25th. Record much as previous. Left eyelid droops a little more than right. There is now marked paresis of both upper extremities, but more right than left. Touches nose fairly well with right forefinger, less well with left. Right triceps reflex a little stronger than left. Considerable paresis right lower extremity, less of left lower extremity. Ankle-clonus right more marked than left.

June 27th. Operation by Dr. Bradford.

After the operation was decided upon, the usual steps were taken in preparing the patient, and in securing complete asepsis. The child's general condition was excellent, and appeared to justify an operation. After anæsthesia (ether having been administered with a previous subcutaneous injection of morphia and atropia) the child was placed upon her belly, and the face turned slightly to the left. The incision usually recommended in cases of cerebellar tumor was made; namely, a curved incision with convexity upwards, extending from one mastoid process to the other, reaching upwards as far as the superior line. The flap was

rapidly dissected downward; an attempt being made to remove not only the flap, but any of the pericranium that adhered to it. Not more than the usual amount of bleeding was met with, until the median line was neared, when a jet of blood was noticed issuing from one of the small foramina occasionally seen in the skull. This bleeding was checked by the insertion of a splinter of wood, cut from a match, which had been prepared for such emergency. A second jet from another foramen was also met, and the bleeding checked in the same way. As the flap was drawn from the median line, a slight amount of fibrous tissue was found to adhere to the skull, and bleeding was noticed to come from this region. The amount of bleeding was at first small, but afterwards became copious, and a third opening, of considerable size, was discovered. On examination the diameter of this opening was much larger than that of any foramen, and no match could control the bleeding. The finger was placed over this immediately, and a piece of cork inserted. The amount of bleeding which had taken place was considerable, though not more than is seen in an ordinary amputation, yet it seemed to cause great collapse, and in a few moments the patient was found to be dead. Artificial respiration was employed, but to no advantage. After death the trephine was applied directly over the opening, and the button of bone removed. On the inner surface the skull was found to be perfectly normal; but the opening, which could be distinctly seen, and which was smooth on the inside except in one spot was found to communicate directly with the sinus at the junction of the lateral and median sinuses, the spot known as the torcular Herophili. The dura was perfectly healthy, and there was no evidence of disease either in the dura or in the bone. The opening was enlarged by means of forceps, and on the right side at

the projection of the posterior lobe of the cerebellum, a large, cheesy mass was easily recognizable. This was removed by the finger, and found to extend to a considerable depth forward and to the left, constituting evidently a tubercular mass.

The existence of this surgical anomaly could in no way have been foreseen. Its existence should serve as a surgical warning, that in operations of this sort, the pericranium should not be too fully stripped up in removing the skin flap in a region over the median line or over the occipital protuberance. How common such an anomaly as this may be, of course, there is no means of determining; as no such case has come to my notice, after investigating the subject with some care. I shall not attempt to define the nature of the opening, except that it was apparently a congenital one, and not due to the presence of disease. The operation could probably have been carried out to the end successfully, if this opening had been avoided. At least there was no reason to judge that there was any cause of death except the loss of blood.

Little need be said of the technique in operations on cerebellar tumors, as they differ in no way from what has been so carefully described in the details for the removal of cerebral tumors elsewhere. The question is simply one of the locality for insertion of the trephine, that is an anatomical one. The lines of indication for the place of trephining are clearly marked by natural limitations, namely, the foramen below, the median line on one side, the mastoid process on the other, and above, the superior line of the occiput, which marks the course of the lateral sinus.

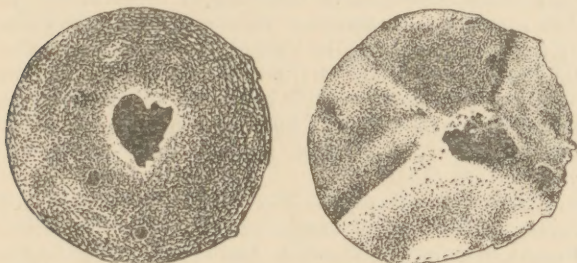
The advisability of an operation on cerebellar tumor has been questioned, as until recently all cases were fatal. Messrs Maudsley and Fitzgerald of Australia, however, had reported a successful case; and Mr.

Horsley writes me that he has recently met with another successful trephining for the relief of pressure, from a growth on the middle cerebellar peduncle. As diagnosis becomes more readily made, and cases present themselves for operation at an earlier stage, the results will in all probability be more favorable than those which have been as yet recorded. The present case illustrates a hitherto unforeseen danger, fortunately one which can, in future cases, be avoided.

No autopsy was permitted. The mass of the tumor removed through the opening, was three-quarters of an inch in depth, and from half to three-quarters in width. The material was hard and cheesy, and on microscopic examination by Prof. W. F. Whitney, there was found a narrow exterior zone of small round cells, with here and there a number grouped into minute rounded nodules; irregularly scattered about were large multi-nucleated bodies, giant cells, but the greater part of the specimen showed cheesy degeneration. No tubercle bacilli were found. The anatomical appearances were those found in large tubercles of the brain.

Professor Whitney reports in regard to the bone as follows: The specimen is a circular piece of bone measuring 3.5 centimetres in diameter. The inner surface is marked by ridges of bone meeting at a central point similar in appearance to the point on the occipital bone (named) the torcular Herophili. At this place is an irregularly oval opening, about 1.0 by .50 centimetres, passing obliquely through the bone to open outside by an irregularly oval opening .75 by .50 centimetres, with a thin and slightly everted edge. The bone lying between these two openings has a worm-eaten look as if vascular sinuses had been found there. Into this space pass one or two large arterial foramina. When first seen the space was lined with

a perfectly smooth tissue in which there was no evidence of any granulations or tubercles. It is probably



External and Internal Surfaces of Bone, from Photographs.

a series of dilated blood sinuses with erosion of the bone.

TUMORS OF THE CEREBELLUM IN CHILDREN.

General Remarks. — The relative frequency of intracranial tumors in children is considerable, about fifteen per cent. out of all intracranial tumors, excluding specific, being found in children of ten years of age or under. Cerebellar tumors are relatively more frequent in children than in adults; that is, the percentage of tumors situated in the cerebellum to that of all intracranial tumors, is greater in children than in adults.

Out of 445 cases of intracranial tumors reported by Bernhardt in which the ages were given 68 (15 per cent.) were in children of ten or under. Steffen considers that the third year of life contains the largest proportion of children thus affected, and in the years following the number is diminished by one-half up to the age of ten. Out of a hundred cases of intracranial tumor collected by Mills and Lloyd, ten

were under ten years of age, twelve between ten and twenty. Gowers says: "The first twenty years (of life) furnish one-third of the cases of cerebral tumor. The proportion in the first decade is 18.5 per cent. If tubercular growths be excluded, the proportion in the first twenty years of life falls to one-fifth." Hale White from one hundred autopsies of intracranial tumor at Guy's Hospital finds that more than half of those dying from cerebral tubercle were under ten years of age ($\frac{24}{45}$).

Relative Frequency.—The relative frequency of cerebellar tumors as compared with all intracranial tumors in children is marked. Out of one hundred cases of intracranial tumors in children of ten years of age or under, taken at random, I find that in nearly fifty the cerebellum was affected. Some of these were cases of single tumors, in many the tumors were multiple. Starr, out of three hundred cases in persons under nineteen years of age, found ninety-six (thirty-two per cent.) cerebellar. Out of the one hundred cases of Mills and Lloyd of intracranial tumors at all ages, only nine were cerebellar.

Bernhardt, out of four hundred and eighty-five intracranial tumors at all ages, gives ninety cases (18.5 per cent.) of tumors of the cerebellum, but in addition to these there are a considerable number in which the cerebellum was affected although it was not the principal seat of the tumor.

Forms of cerebellar tumor.—The relative frequency of the various forms of cerebellar tumor in children has been referred to by various authors. Starr has found the following results from ninety-six cases of cerebellar tumor in persons under nineteen. We have obtained our results as seen in the table from one hundred and twenty-three cases in children of ten years of age or under.

	Starr.		Bullard and Bradford.	
	No.	Per cent.	No.	Per cent.
Tubercle	47	48.95	85	69.10
Glioma	15	15.62	11	8.94
Sarcoma	10	10.42	10	8.13
Glio-sarcoma	1	1.04	1	0.81
Cyst	9	9.37	4	3.25
Carcinoma	3	3.12	2	1.62
Myxoma	0	2	1.62
Gummata	0	1	0.81
Unknown	11	11.46	7	5.69
	96		123	

As to the portion of the cerebellum affected in our cases: In thirty-two the tumors were situated wholly or largely in the right lobe, thirty-two were in the left lobe, and twenty in the middle lobe or centre. In seven cases both lobes were affected and in six the whole cerebellum. In seventeen cases there seems to have been more than one tumor in the cerebellum.

Symptomatology.—Tumors of the cerebellum may be wholly latent, although this is rare. They are usually accompanied by marked general, that is, non-localizing symptoms, headache, vomiting, vertigo and optic neuritis, followed by atrophy of the optic nerve, and frequently, also, mental depression, apathy and gradual mind-failure. There is almost invariably a considerable ventricular effusion, internal hydrocephalus, on the presence of which these symptoms largely depend. The hydrocephalus and the general symptoms above mentioned are apt to be specially marked in tumors of the cerebellum, because the position of the latter is frequently such as either to compress the vena Galeni or other efferent blood-vessels, or to diminish or occlude the communication between the ventricular cavities and the cerebro-spinal canal, in either case causing an excessive accumulation of fluid in the ventricles and the prominence of the symptoms thereby produced.

In addition to these general symptoms there also occur in cerebellar tumors certain others, which, while not so usual an accompaniment of intracranial irritation and compression, yet can hardly be considered as having any definite localizing value. Such, for example, is nystagmus. General clonic convulsions also sometimes occur, but are not especially common. Tremor on voluntary movement, resembling that of cerebrospinal sclerosis is of doubtful localizing value.

Of more importance as a symptom of the position of the tumor is the presence of general tonic convulsions, opisthotonos and tetanoid contractions. When these occur to a marked extent and form a prominent feature, they have a certain localizing significance. Aside from these the true localizing symptoms of cerebellar tumors are few. They may be stated briefly as cerebellar ataxia, rotary movements, and the symptoms produced by the pressure of the tumor on the adjacent or neighboring parts, the pons Varolii, the medulla oblongata and the adjacent nerve trunks. Cerebellar ataxia and rotary movements are the only symptoms due to the affection of the cerebellum itself.

Of the symptoms produced by pressure on other organs, the most important is the presence of paralysis due to pressure on the pyramidal tracts. We shall not, however, enter into the question of indirect or pressure symptoms.

Headache is, as we have said, a usual accompaniment of tumors in the cerebellum. It may be situated in the occipital region and in this case it may be of some slight value when taken with other symptoms as pointing to an affection below the tentorium. Frequently, however, it is situated elsewhere, for example in the supra-orbital region, hence its presence in another region than the occipital and its absence from that region does not contraindicate tumor in the cerebellum.

Vomiting, which occurs in many intracranial tumors and hence is classed as a general symptom, is said to be especially frequent in tumors in this vicinity and may be due in part to pressure on the medulla oblongata.

Double optic neuritis followed by double optic atrophy is an almost invariable symptom in any large tumor in this region. So long as this symptom were wanting, the diagnosis of cerebellar tumor would be a very uncertain one. This symptom is probably largely dependent on the hydrocephalus.

Vertigo, although occurring in many other intracranial affections and being frequently present in tumors in other portions of the cranial cavity, bears an especially prominent part in the case of cerebellar tumors. When considered in connection with the cerebellar ataxia and the rotary movements, of which, however, it is entirely independent, it seems possible that it may have a direct origin in the cerebellum itself, apart from any general cause. Of itself it is not a localizing symptom, but taken in connection with rotation and ataxia it would be of value as tending to confirm the diagnosis. In many young children its presence is naturally difficult to detect and it may easily be overlooked.

The mental conditions are probably, largely secondary to the hydrocephalus, either through compression or otherwise.

Of general tonic convulsions, opisthotonos and tetanoid spasms we can only say that they too, like vertigo, tend to confirm the diagnosis when other symptoms are present. They are supposed to be due in a general way to irritation of the medulla and should probably be classed among the indirect or pressure symptoms.

Cerebellar ataxia and rotary movements, with perhaps, certain forms of vertigo, are the only symptoms so far as we yet know, which are directly caused by

irritation or destruction of the cerebellum. These, however, are distinctly characteristic and when they, or either of them exist, we have a definite localizing agent. It is not our purpose here to enter into the cause of these motions, so far as this is at present understood, but we can say that it is not a simple inco-ordination. Cerebellar ataxia is the term used to denote a peculiar reeling gait, resembling that of a drunken man and totally distinct from that so common in sclerosis of the posterior columns of the cord, the so-called locomotor ataxia. In cerebellar ataxia true inco-ordination of the muscles does not occur, at least in many cases. There is no loss of muscular sense. The upper extremities are frequently not affected (with inco-ordination) even in the latest stages. The difficulty seems to be, not in the transmission of the central influences to the muscles, causing an imperfect and irregular passage thereof, but a direct affection of certain nervous centres, very possibly of a sensory character. In the so-called locomotor ataxia the difficulty seems due, largely, at least, to the irregular and imperfect transmission of motor influences, possibly in part to the affection of unconscious co-ordinating nerve centres in the cord. In cerebellar ataxia the dyskinesia is due to impeded or imperfect action of the sense of equilibration. From affection of the sensory centres or other cause, the normal sense of equilibrium becomes perverted, abnormally increased or abnormally diminished in one or more directions, and this produces in the first place a sensation of general unsteadiness, often enhanced by the vertigo, which it probably also causes in part, and secondly, a sensation of leaning or falling in a special direction. This latter produces a tendency to compensate the supposed inclination or leaning and thus the patient is forced to bend or incline to the opposite side in order to feel himself in equilibrium.

When the affection is severe the patient may fall to the side opposite to that on which he feels himself weak, that is, he may overbalance through mistaken sense of compensation. The direction of the fall, however, has only a doubtful significance, as there often seems a certain paresis on the affected side which causes the patient to fall on the side which seems to him weak. (By the affected side we mean the side of the lesion and the motor impairment connected with the ataxia is on this side.)

In severe cases or in those in which the loss of the balancing sense is very marked, there is sometimes found, in addition to simple want of balance and tendency to fall in a special direction, an impulse to rotation around a vertical axis. This seems to be due simply to an exaggerated loss of the sense of lateral equilibrium and the direction of rotation would appear to be from the affected to the sound side. This is present especially in cases where a lateral lobe or one of the middle peduncles is affected.

It was stated by Nothnagel and the view is still largely accepted, that the ataxic gait (cerebellar) exists only in those cases in which the middle lobe of the cerebellum is either directly or indirectly affected. It is certain, however, that the presence of this symptom does not necessarily imply any direct involvement of the middle lobe and in some cases it has existed to a very marked degree where such involvement did not occur.

The indirect symptoms due to irritation or pressure of the neighboring parts may be of essential aid in forming the diagnosis. We shall not discuss these symptoms here as they belong more properly in the consideration of functions of neighboring organs and are more or less self-evident. We will only note that the paralysis produced by pressure on the pyramidal

tract is usually a late symptom, and that it is hemiplegic in form. It is generally permanent and is on the side of the body opposite to that of the lesion, thus differing from the cerebellar weakness which is on the same side as the lesion. We would also note a fact, which seems thus far largely to have escaped remark, and that is, the presence of temporary pareses of the extremities due to irritation of the pyramidal tracts. These were especially noticeable in our case.

Another symptom to which little attention has thus far been drawn is the presence of a swelling of the face œdematous in appearance, but not pitting on pressure. (This has been especially noted lately in two cases which have come under our observation) and lasting a few hours to a few days. It is possibly due to some vaso-motor disturbance of the lymph vessels and is quite distinct from the flushings due to a similar disturbance of the superficial blood-vessels. This affects principally the cheeks and the middle portion of the face. The eyelids in our cases were not affected.

SURGICAL INDICATIONS; SURGERY OF THE CEREBELLUM.

The first question which arises is, What proportion of these tumors, if any, can be helped or cured by operation, and how far is operation in these cases justifiable? The latter question must be largely determined by the personal equation of the operator. I shall not enter into it at all, but shall only give the facts as far as they can be determined, and leave the conclusions to be drawn by each, according to his best judgment.

Hale White thought that out of one hundred autopsies of all intracranial tumors ten to fourteen were susceptible of operation. This means that, if as much had been known in regard to the tumor before

death as could under the circumstances have been known, these cases were operable.

Starr, out of his three hundred cases of intracranial tumors in children thinks sixteen would have been successful if operated on. He also thinks that in *cerebellar* cases, one-third of the tumors can be reached by the surgeon.

These are general considerations. For the special problem of cerebellar tumors in children of ten years of age or under, we must consider special data. In the first place we have already stated the immense preponderance of tubercular disease, about seventy per cent. This being the case we have always to consider the probability that a given case is due to tubercular disease, unless there is special cause to suppose the contrary.

The three special conditions on which we determine the operability of any cerebellar tumor are its size, its exact position, and its nature (pathological formation). Dependent on these are several factors of much importance: (1) Its duration and the rapidity of its growth; (2) its vascularity; (3) its infiltration; (4) the involvement of neighboring structures, the medulla, etc.; (5) the probability of disease elsewhere, which would cause the removal of the tumor, even if successful, to be of doubtful permanent benefit to the patient. Many of these elements cannot be determined. We will consider them separately.

Size. — The only method we have of in any way estimating the size of a cerebellar tumor, except in rare cases of growth through the bone, is from what we can judge of its nature and duration and from the pressure symptoms. Although tumors of the same nature grow with varying degrees of rapidity, if we can determine the nature, we can in some measure estimate its probable size in relation to the time of

growth. As in most cases, however, the nature of the tumor is somewhat doubtful, we depend largely for our estimate of size on the pressure symptoms when they are such as to afford us any information. We do not include under this head the amount of hydrocephalus, as although this probably depends largely on pressure on the venous channels and the communications between the general ventricular cavity and subarachnoid space, such pressure may be exerted by a comparatively small growth situated in a favorable locality, while a much larger one in another position would exert less influence. It is evident, however, that if there exist evidences of pressure in structures some distance apart and not supplied by the same blood-vessels, or otherwise so connected that pressure on the connecting links may affect them, the tumor must either be a large one or we have to deal with multiple tumors. The diagnosis between these conditions is often very difficult, owing to the frequency of multiple tumors in the cerebellum.

Position. — The exact position of the tumor can rarely be determined. This is due largely to the absence of localizing symptoms within the cerebellum itself. The only symptom referable to the cerebellum itself which can be of service in determining the portion of the cerebellum affected is the direction in which the patient falls or rotates. The rotation is in many cases absent, but when present would seem to be of value. The direction in which the patient falls or towards which he inclines, when lateral, is of but doubtful value, as in some cases patients fall towards, and in others away from the side of the lesion; where the tendency is forwards or backwards this symptom may have more value.

The presence of reeling or staggering can hardly be considered to have much weight in the determina-

tion of the position of the tumor within the cerebellum, because although it is generally considered to be due to irritation or affection of the middle lobe, it is frequently found in tumors which do not involve the middle lobe directly at all; and Bramwell states that in his experience this symptom has been more marked in cases where the tumor has been confined to a lateral lobe. If the diagnosis of cerebellar tumor could be made without the presence of this symptom, its absence would suggest that the tumors were small and situated laterally.

More definite localization within the cerebellum may sometimes, however, be obtained by the effects of pressure on the neighboring organs, the pons, the medulla and the subjacent nerves. In many cases, however, localizing symptoms of this character, especially those due to pressure on the pyramidal tracts, only appear in the later stages.

Pathological Character.—In regard to the pathological character of the tumor little can be determined from its direct symptoms. The general rule that fluctuations and rapid changes in the blood-pressure and general condition of the patient are more liable to occur in vascular than in non-vascular tumors, probably holds good here, but in these cases we are especially likely to find these changes affected and complicated by the conditions of the hydrocephalus, which is influenced by other factors than the vascularity of the tumor. Our principal means of determination, therefore, lie in the history of the case, the duration of the tumor, the apparent rapidity of its growth, the evidence of the presence of other tumors either intracranial or in other organs, or the presence of tubercular disease elsewhere. It goes without saying that, where tubercular disease exists elsewhere or where there is a strong family history of tuberculosis, the

probabilities in favor of the tubercular nature of the tumor are much increased. In like manner the presence of sarcoma, of carcinoma or of gumma elsewhere, would suggest the probability that the cerebellar tumor was likewise of this character.

Where no evidence is obtainable from the history or condition of the patient, we must still remember that the large percentage of tubercular tumors always causes a probability in favor of the tumor being of this nature. Multiplicity of intracranial tumors also points on the whole to their tubercular character; though many other tumors are also multiple, sarcomata and carcinomata, gummata. If a tumor be of extremely slow growth or appears to have become passive, we may suspect a growth from the dura or from the bone.

The *rapidity* of growth of a tumor affects its operability in two ways. In the first place, indirectly, as the operation to be performed must be performed as soon as possible in order to deal with as small a growth as we can. Secondly, as a means of diagnosis of the character of the tumor. On the whole sarcomata, carcinomata and gummata grow quickly, while tubercular tumors, gliomata, cysts and myxomata are slow. Sarcomata from the membranes and osteomata may be very slow.

The vascularity of a tumor affects its operability to a certain degree, and should when possible, be taken into consideration. In cerebellar tumors it seems to be often indeterminable. Pseudo-apoplectic symptoms and fluctuations in the blood-pressure point to it.

The question of infiltration can only be determined from the pathological character of the tumor. Except the long duration in some gliomata we have no intrinsic data.

The question of the multiplicity of tumors is very

important. Where evidence of the presence of tumor in other parts of the body exists, or where tubercular or syphilitic disease manifests itself elsewhere, the case is simple. The same may be said where we have evidence of multiple intracranial tumors. In the latter case certainly one would hesitate long before considering any operation justifiable.

But the important question is, What are the chances in the case of any given cerebellar tumor in children of ten or under, that we have to deal with a simple tumor, and not with either multiple tumors or with dyscrasic manifestations such as tubercular meningitis, miliary tuberculosis, or in the case of gummata with syphilitic lesions of another character?

These questions can only be settled by statistics. We find out of 121 tumors that 48 (39.6 per cent.) are single and uncomplicated. (This number is probably too large as we have counted here all those in which no special mention of multiplication or complication was made.) Fifty-six (46.2 per cent.) were multiple, and in addition to these 17 (14 per cent.) showed disease, usually tuberculosis, elsewhere in the body. Out of 84 tubercular tumors we find 48 (57 per cent.) multiple and 17 (20 per cent.) complicated by tuberculosis or other trouble elsewhere, and only 19 (22.6 per cent.) reported single and uncomplicated. It must be remembered, however, in considering these figures that these results are all obtained at autopsies, and that it is very probable that in earlier stages many more of these cases were uncomplicated and single.

Of our gliomata, two were multiple; ten, including a glio-sarcoma, were single; no lesions elsewhere reported. Sarcomata, single, nine, including two angio-sarcomata; and multiple, two, one melanotic. Carcinomata are probably always secondary. Gummata are frequently complicated or multiple.

Of surgical operations for tumors of the cerebellum, we can find but four up to the present date. Of these, three were fatal and one successful. These cases are:

(1) May. Male, seven. Tubercular tumor, right lobe of cerebellum. Death in a few hours, from shock. (*Lancet*, 1887, I, 768.)

(2) Suckling. Female, twelve. Glioma, left lobe of cerebellum. Death in forty-eight hours, from shock. (*Lancet*, 1887, II, 656.)

(3) Horsley. Male, eighteen. Tubercular tumor, chiefly in right lobe of cerebellum. Death in nineteen hours. (*British Medical Journal*, 1887, I, 863.)

(4) Maudsley. Male, twenty-eight. Tumor pressing on left lobe of cerebellum. Not removed. Recovery from operation, and improvement. (*Transactions Intercolonial Medical Congress of Australasia*.)

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